

-13-

REMARKS

In response to the Office Action mailed April 13, 2006, Applicants respectfully request reconsideration. To further the prosecution of this Application, Applicants submits the following remarks, have canceled claims and have added new claims. The claims as now presented are believed to be in allowable condition.

Claims 1-9, and 13-27 were pending in this Application. By this Amendment, claims 2, 4-6, 9, 18, and 23 have been canceled. Applicants expressly reserve the right to prosecute at least some of the canceled claims and similar claims in one or more related Applications. Claims 28-33 have been added. Accordingly, claims 1, 3, 7-8, 13-17, 19-22, and 24-33 are now pending in this Application. Claims 1, 3, 13, and 17 are independent claims.

The limitations of canceled dependent claims 4-6 have been incorporated into the text of dependent claim 7. The limitations of canceled dependent claim 2 have been incorporated into the text of dependent claim 21. The limitations of canceled dependent claim 18 have been incorporated into the text of dependent claims 19 and 20.

Rejections under §102 and §103

Claims 1, 3, 13-15, and 17 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,208,517 (Prince, et al.) in view of U.S. Patent No. 5,640,305 (Smithers).

Claim 20 was rejected under 35 U.S.C. §103(a) as being unpatentable over Prince in view of Smithers in further view of U.S. Patent No. 5,270,492 (Fukui).

-14-

Claims 7-8, 19, and 21-22 were rejected under 35 U.S.C. §103(a) as being unpatentable over Prince in view of Smithers in further view of Fukui in further view of U.S. Patent No. 5,786,989 (Kawabe).

Claim 16 was rejected under 35 U.S.C. §103(a) as being unpatentable over Prince in view of Smithers in further view of U.S. Patent No. 5,346,118 (Degani, et al.) in further view of U.S. Patent No. 5,249,977 (Tanaka, et al.) in further view of Fukui.

Claims 24-27 were rejected under 35 U.S.C. §103(a) as being unpatentable over Prince in view of Smithers in further view of Kawabe in further view of Fukui.

Applicants respectfully traverse each of these rejections and request reconsideration. The claims are in allowable condition.

Prince discloses a heat sink 100 having a plurality of folds 102 (column 2 line 66 through column 3, line 2 and Figs. 2-3). Located on the outermost folds 103 are feet 104 (column 3, lines 2-3 and Fig. 3). Mounting receptacles 130, 140, 150 may be mounted to a printed circuit board 106 to provide an interface for securing the heat sink 100 in position over a device package 108 (column 4, lines 2-7 and Figs. 5A, 5B and 5C). The heat sink 100 attaches to the circuit board 106 via a horizontal spring force which retains the feet 104 within mounting receptacles 112 (e.g., see column 3, lines 2-27 and Fig. 4).

Smithers discloses a wire spring 20 with a pin fin heat sink 21 and an electronic device 22 (column 2, lines 31-33 and Fig. 5). These components are secured to a printed circuit board 18 by an anchor 10 (column 2, lines 33-36).

Fukui discloses an electronic device having leading end portions with respective lead terminals 2. Fukui was cited as teaching apertures in the leading end portions to allow gas produced while soldering to escape through the apertures. (column 3, lines 1-30 and Fig. 1).

Tanaka was cited as teaching using automated pick and place equipment.

Kawabe teaches a mounting structure to mount a circuit board to a frame of an electronic device. The mounting structure body, in one embodiment, is composed of a non-conductive material, and it includes a threaded portion for receiving a screw to affix it to the frame. The mounting structure body is also attached to a lead which is soldered to the circuit board. In one embodiment the conductive leads are attached to the conductive screw to provide an electrical connection between the frame and the circuit board. In one embodiment Kawabe teaches that the threaded portion is parallel to the circuit board.

Degani was cited as teaching a surface mount technology process.

In order to establish a *prima facie* case of obviousness, the Office Action must meet three criteria.

"First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations."¹

Claims 1 and 21-22

Claim 1 is directed to a circuit board module having, *inter alia*, (i) a heat sink, (ii) a first clip holder and a second clip holder, each clip holder being

¹ *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

mounted to respective surface mount pads of the circuit board using a surface mount technology soldering process, and (iii) a clip having a first portion configured to fasten to the first clip holder, a second portion configured to fasten to the second clip holder, and a third portion coupled to the first and second portions. The third portion is configured to position the heat sink adjacent the circuit board component when the first and second portions are respectively fastened to the first and second clip holders.

The cited references do not teach or suggest, either alone or in combination, a circuit board module having a heat sink, surface mounted clip holders, and a clip to position the heat sink adjacent a circuit board component, as recited in claim 1. Rather, Prince teaches a heat sink 100 with feet 104 that attach to a circuit board via a horizontal spring force which retains the feet 104 within mounting receptacles 112 (e.g., see column 3, lines 2-27 and Fig. 4). Although Prince also teaches a clip 114, this clip merely prevents the heat sink from fanning out – it does not fasten the heat sink in place. Since the Prince heat sink 100 properly attaches to the circuit board by retaining the feet 104 within the mounting receptacles 112 and since such attachment occurs without the need of a clip to position the Prince heat sink 100 adjacent a circuit board component, it is unclear why one would want to modify Prince to include such a clip. For example, how could the addition of a clip improve the ability of the Prince heat sink 100 to retain the feet 104 within the mounting receptacles 112? If anything, it would seem that the addition of such an additional clip would interfere with the horizontal spring force which retains the feet 104 within the mounting receptacles 112.

Smithers teaches a wire spring 20 for a pin fin heat sink 21 that attaches to an anchor 10 on a circuit board. Nothing in Smithers teaches or suggests why the apparatus of Prince needs a clip. Indeed, Prince does not need a clip at all – the heat sink 100 is already sufficiently attached to the circuit board via the feet

104. Moreover, there is no way to utilize the wire spring 20 from Smithers in order to affix the Prince heat sink 100 to the device package 108.

The Office Action interprets Prince and Smithers slightly differently. The rejection in the Office Action is susceptible to two possible interpretations, which are both traversed in turn.

Under one possible interpretation, the Office Action argues that in light of Smithers, it is obvious to modify Prince by separating the Prince heat sink/clip 100 into separate heat sink and clip portions (page 3, first paragraph). However, this approach does not appear to be what the Office Action intended since there is no reason why one might want to break the perfectly functional heat sink 100 of Prince at each end and then somehow attach the central heat sink portion 103 & 116 to the two feet 104, which have been broken off. Since the Prince heat sink already attaches perfectly well to the circuit board without splitting it up into separate heat sink and clip components, there is no motivation to modify Prince at all. Furthermore, even if one were to modify Prince in this manner (by detaching the feet from the remainder of the heat sink to form clips), such a design would not result in the invention as recited in claim 1 because there would be no third portion "configured to position the heat sink adjacent the circuit board component when the first and second portions are respectively fastened to the first and second clip holders," as recited in claim 1.

Under a second possible approach, the Office Action states that Prince teaches a clip but fails to teach a separate heat sink component. The Office Action continues by arguing that it is nevertheless obvious to add a separate heat sink in light of Smithers (page 3, first paragraph). Yet, although Prince does not teach a separate heat sink component, it does teach a heat sink component. In fact, the heat sink component and the clip component are integral in one part in Prince. However, the central portion of the clip in Prince 103 & 116 is not "configured to position the heat sink adjacent the circuit board component."

-18-

Instead, it is the first and second portions of the clip/heat sink 103 which position the remainder of the heat sink adjacent to the circuit board. Therefore, the prior art references do not "teach or suggest all the claim limitations."

In addition, the Office Action has failed to establish a *prima facie* case of obviousness.

If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious.²

Similarly,

If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification.³

Smithers teaches a pin fin heat sink 21 (column 2, line 32), while Prince teaches a flat ribbon spring clip 100. Any combination of the assembly in Prince with the pin fin heat sink 21 of Smithers would change the principle of operation of Prince and render the Prince assembly unsatisfactory for its intended purpose. Since the clip/heat sink in Prince is intended to touch the device package 108, or possibly a metal plate 109 "located between the device package 108 and the heat sink 100 to enhance the thermal coupling therebetween," (Prince column 3, lines 5-7), placing a pin fin heat sink below the clip/heat sink 100 would prevent the clip/heat sink 100 of Prince from serving its intended purpose of cooling the device package 108. Instead, the pin fin heat sink 21 of Smithers would serve to cool the device package 108, thereby altering the principle of operation of the assembly. If, instead, the pin fin heat sink 21 of Smithers were to be placed above the clip/heat sink 100 of Prince, then the pin fin heat sink 21 would not be coupled to the assembly with a clip, which would change the principle of operation of Smithers and render the entire assembly unsatisfactory for its

² MPEP 2143.02(VI), citing *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959).

³ MPEP 2143.02(V) citing *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984).

intended purpose since the pin fin heat sink would then not be attached to the heat sink and it could fall off at any time.

In addition, there would not be a reasonable expectation of success in combining the heat sink 21 from Smithers with the Prince assembly. Indeed, such a combination would be unlikely to function. Smithers teaches a pin fin heat sink 21 (column 2, line 32), while Prince teaches a flat ribbon spring clip 100. The clip 100 from Prince would not affix the pin fin heat sink to the electronic device package 108 to be cooled. Such device package 108 is fully covered by the clip in Prince (Fig. 2). Thus, there is no room for the pin fin heat sink 21 of Smithers to fit underneath the clip/heat sink 100 of Prince.

This combination of features is not suggested or motivated by the cited prior art. For the reasons stated above, claim 1 patentably distinguishes over the cited prior art, and the rejection of claim 1 under 35 U.S.C. §103(a) should be withdrawn. Accordingly, claim 1 is in allowable condition.

Because claims 21 and 22 depend from and further limit claim 1, claims 21 and 22 and 28 are in allowable condition for at least the same reasons. Additionally, it should be understood that the dependent claims recite additional features which further patentably distinguish over the cited prior art. For example, claim 21 recites clip holders “wherein the non-conductive body portion of each clip holder *defines a cavity for fastening with the clip*, the cavity extending in a direction that is substantially parallel to the plane.” This feature is not taught or suggested by the cited prior art. The Office Action cites Kawabe at Fig. 7C, No. 6c against this feature. However, the cavity taught by Kawabe is a threaded hole to interface with a screw in order to attach a mounting bracket to a frame 2 of an electronic device. Kawabe at column 9, lines 46-52. The cavity in Kawabe is not a *cavity for fastening with the clip*. Instead it fastens to a screw, and the screw then fastens to a frame (which is not a heat sink clip). Furthermore, the cavity in Kawabe is not even appropriate to receive the clip, since it is threaded.

In addition, claim 21 also recites "a surface *to interface with automated pick and place equipment*." This feature is not taught or suggested by the cited prior art. The Office Action notes that this feature is taught in Kawabe at Fig. 7C, No. 6a top. However, that reference, while teaching a flat surface, does not teach that the flat surface may interface with automated pick and place equipment. Indeed, Kawabe nowhere even mentions automated pick and place equipment. If the rejection of claim 21 is to be maintained, Applicants respectfully request that it be pointed out with particularity where the cited prior art teaches such a cavity for fastening with a clip and where the cited prior art teaches such an interface with automated pick and place equipment.

Claims 3 and 7-8

Claim 3 recites a heat sink assembly that is similar to the heat sink assembly recited within claim 1. Accordingly, claim 3 patentably distinguishes over the prior art for similar reasons as does claim 1. Thus, the rejection of claim 3 under 35 USC §103(a) should be withdrawn, and claim 3 is in allowable condition.

Because claims 7-8 depend from and further limit claim 3, claims 7-8 are in allowable condition for at least the same reasons. Additionally, it should be understood that the dependent claims recite additional features which further patentably distinguish over the cited prior art. For example, claim 7 adds limitations to claim 3 that are similar to those limitations added by claim 21 (see *supra*) to claim 1.

Claims 13, 14-16, and 24-25

Claim 13 recites a heat sink assembly that is similar to the heat sink assembly recited within claim 1. Accordingly, claim 13 patentably distinguishes over the prior art for similar reasons as does claim 1. Thus, the rejection of claim 13 under 35 USC §103(a) should be withdrawn, and claim 13 is in allowable condition.

Because claims 14-16 and 24-25 depend from and further limit claim 13, claims 14-16 and 24-25 are in allowable condition for at least the same reasons. Additionally, it should be understood that the dependent claims recite additional features which further patentably distinguish over the cited prior art. For example, claim 24 adds limitations to claim 13 that are similar to those limitations added by claim 21 (*see supra*) to claim 1.

Claims 17, 19-20, and 26-27

Claim 17 recites a heat sink assembly that is similar to the heat sink assembly recited within claim 1. Accordingly, claim 17 patentably distinguishes over the prior art for similar reasons as does claim 1. Thus, the rejection of claim 17 under 35 USC §103(a) should be withdrawn, and claim 17 is in allowable condition.

Because claims 19-20 and 26-27 depend from and further limit claim 17, claims 19-20 and 26-27 are in allowable condition for at least the same reasons. Additionally, it should be understood that the dependent claims recite additional features which further patentably distinguish over the cited prior art. For example, claim 26 adds limitations to claim 13 that are similar to those limitations added by claim 21 (*see supra*) to claim 1.

-22-

Newly Added Claims

Claims 28-33 have been added and are believed to be in allowable condition. Claim 28 depends from claim 1. Claim 29 depends from claim 3. Claim 30 depends from claim 17. Claim 31 depends from claim 28. Claim 32 depends from claim 29. Claim 33 depends from claim 30. Support for claims 28-30 is provided within the Specification, for example, on page 6, line 13 and Fig. 2, Nos. 36 and 52. Support for claims 31-33 is provided within the Specification, for example, on page 9, lines 6-18 and on page 10, lines 18-21, and at Fig. 1. No new matter has been added.

Conclusion

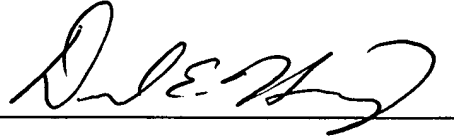
In view of the foregoing remarks, this Application should be in condition for allowance. A Notice to this affect is respectfully requested. If the Examiner believes, after this Response, that the Application is not in condition for allowance, the Examiner is respectfully requested to call the Applicants' Representative at the number below.

Applicants hereby petition for any extension of time which is required to maintain the pendency of this case. If there is a fee occasioned by this response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 50-3661.

If the enclosed papers or fees are considered incomplete, the Patent Office is respectfully requested to contact the undersigned collect at (508) 616-2900, in Westborough, Massachusetts.

-23-

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'David E. Huang', is written over a horizontal line.

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